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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,579	11/24/2003	Sangyum Kim	1772-5	5710

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EXAMINER	
WONG, EDNA	
ART UNIT	**PAPER NUMBER**
1753	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/720,579	KIM ET AL.	
	Examiner	Art Unit	
	Edna Wong	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) *12-15* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Election/Restrictions

Applicant's election of Group **I**, claims **1-11**, in the reply filed on August 8, 2007 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

The requirement is still deemed proper and is therefore made FINAL.

Accordingly, claims **12-15** are withdrawn from consideration as being directed to a non-elected invention.

Specification

The disclosure is objected to because of the following informalities:

page 9, line 2, the word "Thiourea" should be amended to the word -- thiourea --.

page 11, line 15, the word "a" should be amended to the word -- an --.

Appropriate correction is required.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

Claims **1 and 7** are objected to because of the following informalities:

Claim 1

lines 7-8, "a HEC(Hydroxyethyl Cellulose) of 0.05ppm~50ppm" should be amended to -- 0.05 ppm ~ 50 ppm of a hydroxyethyl cellulose (HEC) --.

lines 8-9, "a SPS(bis(sodiumsulfopropyl)disulfide) of 0.05~20ppm" should be amended to -- 0.05 ppm ~ 20 ppm of bis (sodium sulfopropyl) disulfide (SPS) --.

Claim 7

line 2, it is suggested that the phrase "than one selected from the steps of" be amended to the phrase -- processes selected from the group consisting of --.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

Claims **1-11** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1

lines 1-2, recites "A method for manufacturing an electrodeposited copper foil

comprising".

lines 6-7, recites "a method for manufacturing an electrodeposited copper foil *which is characterized in that*".

There are two separate introductions to the method steps. Thus, the positive method steps are unclear.

line 6, it appears that "a method for manufacturing" is the same as the method for manufacturing recited in claim 1, line 1. However, it is unclear if it is. If it is not, then what is the difference between the methods for manufacturing?

line 6, it appears that "an electrodeposited copper foil" is the same as the electrodeposited copper foil recited in claim 1, line 1. However, it is unclear if it is. If it is not, then what is the difference between the electrodeposited copper foils?

line 9, recites "*is added* to the electrolyte". It is unclear how the additive is added to the electrolyte when the "electrolyte *consists of*" is closed as recited in claim 1, line 4.

Claim 7

line 8, it is unclear which resin, "the resin", is further limiting. Is it the resin recited in claim 7, line 4, or the resin in the resin layer recited in claim 7, line 5?

Claim 9

lines 1-2, recite "wherein said electrolyte *is comprised of*". However, claim 1, lines 3-4, recite "said electrolyte *consists of*". The scope of the electrolyte is unclear.

Claim 11

line 1, recites "a current density of the electrolyte". It is unclear how the electrolyte has a current density. It appears that "20~150 A/dm^2" is further limiting the applied negative current (from claim 1, line 5) and/or the applied positive current (from claim 1, lines 5-6).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims **1-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Wolski et al.** (US Patent No. 5,834,140) in combination with **Yates et al.** (US Patent No. 5,863,410) and **Merchant et al.** (US Patent No. 5,863,666).

Wolski teaches a method for manufacturing an electrodeposited copper foil in which:

a rotating drum **2** (= a drum-shaped cathode) and an anode plate **1** which is

formed of a curve distanced from the outer surface of the drum by a certain distance (= provided to a concentric circle shape to said cathode **2**) are drowned in an electrolyte **3** (col. 3, lines 3-13; and Fig. 1), said electrolyte consists of:

(i) a sulfuric acid (col. 6, lines 53-56),

(ii) copper ion (= from copper sulfate) [col. lines 53-56], and

(iii) chloride ion (col. 6, lines 14-29), and

the electrodeposited copper foil **4** (= the untreated copper foil) is deposited on the surface of the drum as a negative current (= a cathode) is applied to the drum **2**, and a positive current (= an anode) is applied to the anode plate **1** (col. 3, lines 3-13; and Fig. 1),

a method for manufacturing an electrodeposited copper foil **4** (= the untreated copper foil) which is characterized in that an additive which consists of:

(i) a gelatin of 0.1~100 ppm (= 5.0 and 6.0 ppm glue = gelatin) [col. 5, lines 42-54] (col. 8, Table 1, Examples 3-4), and

(ii) a HEC (hydroxyethyl cellulose) of 0.05 ppm~50 ppm (= 3.0 and 5.0 ppm HEC) [col. 8, Table 1, Examples 3-4] is added to the electrolyte.

The amount of the addition of the gelatin is 2~5 ppm (= 5.0 ppm glue = gelatin) [col. 5, lines 42-54] (col. 8, Table 1, Example 4).

The amount of the addition of the HEC is 1~3 ppm (= 3.0 ppm HEC) [col. 8, Table 1, Example 3].

The method further comprises a post-treatment process (= a bond enhancing

treatment and stain proofing) [col. 9, lines 47-56].

The post-treatment process is formed of one or more than one selected from the steps of: a nodule process for forming a nodule on one side or both sides of the electrodeposited copper foil for increasing an adhesion with a resin; a barrier process for preventing a copper from being diffused into a resin layer; a corrosion resisting process for preventing an oxidation of the electrodeposited copper foil; and a silane coupling agent process for enhancing an adhesion reliability with the resin (= a manner of copper nodules to be deposited to the surface subjected to the bond enhancing treatment of the foil) [col. 3, lines 38-54].

The electrolyte is formed of a sulfuric acid of 50~200 g/l (= 110 g/l of sulfuric acid) and a copper ion of 30~150 g/l (= 90 g/l of copper) [col. 8, lines 45-54].

A temperature of the electrolyte is 20~80°C (= 58°C) [col. 8, Table 1, Temperature"].

A current density of the electrolyte is 20~150 A/dm^2 (= 50 A/dm^2) [col. 8, Table 1, "Current density"].

The method of Wolski differs from the instant invention because Wolski does not disclose the following:

a. Wherein the additive consists of a SPS (bis (sodium sulfopropyl) disulfide) of 0.05 ppm~20 ppm, as recited in claim 1.

b. Wherein the amount of the addition of the SPS is 0.5~3 ppm, as recited in

claim 4.

Wolski teaches that adding *3-mercapto-1-propanesulfonate* in combination of the high molecular weight polysaccharide and/or the low molecular weight glue and a minute amount of the chloride ion to the electrolyte, various characteristics required for a low-profile copper foil for fine patterning can be realized at a high level (col. 6, lines 30-35).

Like Wolski, Yates teaches an electrolytic process for producing copper foil having a low profile surface (col. 1, lines 7-11). Yates teaches that water soluble, *sulfonated organic sulfur compounds* are important addition agents. *Many simple bivalent sulfur organic compounds possess similar ability* and thus be useful as additions agents in the electrodeposition of copper. These substances can belong to the group of aliphatic thiols, R-SH, sulfides, R^1-S-R^2, *disulfides R^1-S-S-R^2*, as well as aromatic and heterocyclic thiols, sulfides and disulfides (col. 10, line 55 to col. 11, line 2).

Like Yates, Merchant teaches an electrolytic process for producing copper foil (col. 3, lines 59-62). Merchant teaches that it is critical that the concentration of organic additives in the electrolyte solution be at least about 0.3 ppm. The organic additive can be selected from the group consisting of saccharin,... *sulfopropyl disulfide*, ... (col. 4, line 64 to col. 5, line 15).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the additive described by Wolski with wherein the

additive consists of a SPS (bis (sodium sulfopropyl) disulfide) of 0.05 ppm~20 ppm; and wherein the amount of the addition of the SPS is 0.5~3 ppm because a disulfide would have been a functionally equivalent addition agent to a sulfonated organic sulfur compound as taught by Yates (col. 10, line 55 to col. 11, line 2), and a sulfopropyl disulfide would have been an obvious disulfide to use in an electrolytic process for producing copper foil as taught by Merchant (col. 4, line 64 to col. 5, line 15), and a bis (sodium sulfopropyl) disulfide would have been an obvious sulfopropyl disulfide to use in an electrolytic process for producing copper foil because structural relationships may provide the requisite motivation or suggestion to modify known compounds to obtain new compounds.

c. Wherein a roughness of a matte side of the electrodeposited copper foil is larger than a roughness of a shiny side, as recited in claim 5.

Wolski teaches that the untreated copper foil, the so-called *shiny side* which is a surface at the side of contacting with the drum has a *relatively smooth surface*, but at the reverse surface called *a matte side, unevenness is relatively remarkable* (col. 3, lines 55-58). The surface roughness of the untreated copper foil is almost determined by the electrolysis conditions when copper is deposited on the drum-shaped cathode, particularly by an additive to be added to an electrolyte (col. 3, lines 50-54).

The invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because the so-called shiny side which is a

surface at the side of contacting with the drum would have had a relatively smooth surface, but at the reverse surface called a matte side, unevenness would have been relatively remarkable as taught by Wolski (col. 3, lines 55-58).

d. Wherein a molecular weight of the gelatin is *above 10000*, as recited in claim 8.

Wolski teaches that the commercially available products have weight average molecular weights (Mw) of *10,000* or less (col. 5, lines 42-54).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the molecular weight of the gelatin described by Wolski with wherein a molecular weight of the gelatin is above 10000 because a *prima facie* case of obviousness exists where claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties (MPEP § 2144.05(I)).

For example, a Mw of 10,000 versus a Mw of 10,001.

e. Wherein said electrolyte is formed of a chloride ion of 200 mg/l, as recited in claim 9.

Wolski teaches that in order to produce a low-profiled copper foil in a broad current density range stably, it is preferred to keep the amount in a range of 10 to 60 ppm. *Even when the amount exceeds 60 ppm, low profiling can be effected* (col. 6, lines

14-29).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electrolyte described by Wolski with wherein said electrolyte is formed of a chloride ion of 200 mg/l because when the amount exceeds 60 ppm, low profiling would have still been effected as taught by Wolski (col. 6, lines 14-29).

Furthermore, the concentration of chloride ions is a result-effective variable and one skilled in the art has the skill to calculate the concentration that would have determined the success of the desired reaction to occur, e.g., to produce a low-profiled copper foil in a broad current density range stably (MPEP § 2141.03 and § 2144.05(II)(B)).

Citations

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Vuigner ("The Role of Colloids in the Industrial Electrolysis of Copper", *Bull. Soc. Franc. Elec.* (1944), Vol. 4, pp. 261-264) is cited to teach the addition of gelatin and cellulose to Cu baths (abstract).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edna Wong whose telephone number is (571) 272-

1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Edna Wong
Primary Examiner
Art Unit 1753

EW
August 16, 2007